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ABSTRACT

This paper chronicles the building of a student based Web site method of quickly getting homework graded and back to the students with feedback. A Web site-supported statistics class offers an opportunity for students to check answers, get immediate feedback, and submit homework. A web-based support system should provide assistant for students of varied abilities (Lee & Hawworth, 1997). Using previously gathered students' and instructors' suggestions, development of a meaningful tool for student learning through homework assignments was undertaken. During the last two semesters, when students turned in their assignments before the absolute deadline, their quiz grades reflected an average of twenty percent better performance when compared to those who waited until the last moment. Those who waited until the last moment stated a need for additional help before they could finish their assignments. From the instructors' point of view, some of the suggestions for the Web site were as follows: a user-friendly data entry was very important in order for any member of the faculty to use and benefit; a textbook interface to be able to transfer information already created by the publishers; to be able to build assignments, quizzes, exams using an instructional objectives base; to have the capacity to support multiple academic disciplines; multiple question formats (multiple choice, multiple-responses, true and false, matching); automated transfer of student records such that explanation for current grades could be offered quickly and easily. A self-reflection of faculty practice would be strengthened by feedback received from a web-based system. Feedback demonstrating areas of student weakness can enable faculty to alter their teaching to reemphasize those concepts before the next quiz or exam (Paulsen & Feldman, 1995). From the students' input, some of the suggestions were as follows: assignment schedules; illustrative examples (practice problems); immediate feedback; multiple trials prior to submission; ability to determine where mistakes are made (seeing the completed solution); the capacity to interrupt their on-line sessions and return at their leisure within time frame); self monitoring of progress by means of a grid for each student. To create a web site that addresses all of these thoughts and more requires a systematic procedure. It was believed that using a suite of products which would be familiar and interconnected would widen the use of the final product. It was with these thoughts that FrontPage2000 and Access2000 would be the major resources which faculty and students would use. The first stage was a homework site which

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would present assignments, allow student to interact and check answers, grade assignments, enter grades into a grade book, and give faculty members important information about each student and/or class. Seven appendixes provide supporting materials. (AEF)

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Collaboration Of Students And Faculty Creating A Web-Site Based For Homework.

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Statistics students unfortunately are unnecessarily terrified or anxious. For some this fear of math is "a debilitative emotion. ...because (1) they are extremely unpleasant, and (2) they tend to lead to self-defeating behavior..."(Kranzler, 1999) For instructional field like statistics, the practice of concepts during the manipulation of homework provides the student the opportunity of assimilation. (Langdon & Stout, 1969) suggests that homework allows the student to work and practice concepts presented in class. He further states that it develops independent study, and helps develop the skills needed. Neill states that learning activities accomplish two functions: "help learners acquire information or cause learners to practice". (Neill, 1998)

The this paper chronicles the building of a student based Web-site method of quickly getting homework graded and back to the students with feedback. A Web-site supporting a statistics class would offers an opportunity for students to check answers, get immediate feedback, and submit homework. A web-based support system should provide assistant for students of varied abilities (Lee & Hawworth, 1997). They further stated that the assistances must contain immediate feedback. It would strengthen the learning of advanced students. The feedback should aid the weaker student by guiding then to a successful completion of their task. This was supported in an article by Guernsey, (1999) stating, "immediate feedback encourages students to keep working on problems that give them trouble." Using previously gathered students and instructors' suggestions; a development of a meaningful tool for student learning through homework assignments was undertaken.

During the last two semesters, when students turned in their assignments before the absolute deadline, their quiz grades reflected an average of twenty percent better performance when compared to those who waited until the last moment. Those that waited until the last moment stated a need for additional help before they could finish their assignments. This would support the statement of (Carroll, 1963) suggests that learning is function a ratio of time spent studying content to the time needed by each individual student to learn the material. Another study by Aldosary, (1995) demonstrated a strong correlation between homework and final scores suggesting that heavier consideration of homework completion should be placed in the grading system. A web-based homework module might give the added support needed to some of these students. Motivation added to the students by receiving immediate feedback to their own progress was suggested by Guernsey, 1999. Commercially available resources for online learning are available which contain many of the ideas, which were thought to be important by student and faculty. Some of these sources maybe of interest to others but we chose not to avail ourselves of their products. It was decided to build the web-site so it would be functional and compatible to the stakeholders.

From the instructors point of view, some of the suggestions were as follows: 1). A user-friendly data entry was very important in order for any member of the faculty to use and benefit. 2). A textbook interface to be able to transfer information already created by the publishers. 3). To be able to build assignments, quizzes, exams using an instructional objectives base, 4). To have the capacity to support multiple academic disciplines. 5). Multiple question formats (multiple choice, multiple-responses, true and false, matching) 6). Automated transfer of student records such that explanation for current grades could be offered quickly and easily. A self-reflection of faculty practice would be strengthened by

feedback received from a web-based system was suggested by Paulsen & Feldman (1995). Feedback received demonstrating areas of student weakness can enable faculty to alter their teaching to reemphasize those concepts before the next quiz or exam (Paulsen & Feldman, 1995).

From the students input, some of the suggestions were as follows: 1) Assignment schedules, 2). Illustrative examples (practice problems), 3). Immediate feedback 4).Multiple trials prior to submission, 5). To be able to determine where mistakes are made (seeing the completed solution), 6) The capacity to interrupt their on-line sessions and return at their leisure (within time frame), .7). Self monitoring of progress by means of a grid for each student. Many of these student suggestion were stated for the work done by others (Mory, Gambill, & Browning, 1998) , (Kao & Lehman, 1997) ,(Winne, 1995).

To create a web-site which addresses all of these thoughts and more requires a systematic procedure. It was believed that using a suite of products which would be familiar and interconnected would widen the use of the final product. It was with these thoughts that FrontPage2000 and Acess2000 would be the major resources which faculty and students would use. The first stage was a homework site which would present assignments, allow student to interact and check answers, grade assignments, enter grades into a grade book, and give faculty members important information about each student and/or class.

Looking at the requests of the instructors , the first stage of this development demonstrated the easy of data entry into a data base supporting any discipline with multiple question formats and transfer of student records. From the students suggestions came the assignment schedule, immediate feedback with multiple trails allowed and correctness of assignment answer with hints to solution for wrong answers.. These ideas were set out in outline form to set the procedure

for the actual development (See Appendix E). A sample of the data base is shown in Appendix F.

The first stage used a set of statistics classes in a Midwest College with 200 students. Students were required to get assignments, complete assignments on-line or off line and enter results of these assignments and get immediate feedback. Students were asked to complete an evaluation form after testing the newly installed web site. Feedbacks from these evaluations allow the designers to re-tool the site to become more student friendly. The most requested addition was a navigation tool to allow the recheck of a single problem, which was judged incorrect. In order to do this task the program would be asked to retain the previous entered scores and allow a change of one or more answers before resubmitting the assignment for final grading. Also requested were more hints, practice questions with systematic solutions to enable a student to see the proper method of solving each type of problem. Comments of students suggested that this initial stage of development was beneficial and will enable the development of an even more complex website with practice quizzes, more links to other sources of information.

Faculty received information about when a student was using the systems and how they were doing. One important piece of information for the instructor was the documentation of which problem(s) where giving the students the most trouble, enabling more instructional time to be spent on that topic in class before the next quiz. During the first run of homework assignments a key component of recording this information was not activated, so the first opportunity of testing this slipped by. The documentation of time of homework completion may lead to better ways to help some of the struggling students. A email from a particularly

math anxious student stated "...did the homework that was on the web site. I did it, on my own and I did it right!" (See Appendix G).

The future expansion of this trial will include problems similar to homework so a student can see the sequential steps required to solve a problem. More hints to explain the area of error of each problem (e.g., when ever possible why choice b was incorrect).

A walk through the pilot web-site will demonstrate the step by step procedure taken by students doing their homework online. The opening screen (See Appendix A) greets them by name and their course section. The student here has the option to choose what assignment to work on. The selection of assignment is presented on problem at a time (See Appendix B). The entire problem is presented with data for the student to solve. A series of answers is presented for the student to check once the problem has been solved. Navigation buttons allow a student to move forward or backward , to change answers before leaving screen, and to submit for checking. The design allows for a picture to be presented and a table of data simultaneous. Once the answers are submitted for checking a screen is shown with the final percentage score with number of right out of the number of problems in the set (See Appendix C). The Wrong answer can be checked by clicking on the problem number in the third column for example 12(A) shown in the appendix. By double clicking on the problem number another screen, the hint screen, is presented (See Appendix D). This allows the student to recognize the proper procedure to solve the problem. Or perhaps if the procedure is correct, then the student would understand to check his/her math computations.

Carroll, J. B. (1963). A Model of School Learning. *Teachers College Record, 64*, 723-733.

Kao, M. T., & Lehman, J. D. (1997, 1997). *Scaffolding in a computer-based constructivist Environment for Teaching Statistics to College Learners.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Langdon, G., & Stout, I. W. (Eds.). (1969). *Homework.* New York: John Day Co.

Mory, E. H., Gambill, L. E., & Browning, J. B. (1998). *Instruction on the Web: The online student's perspective.* Paper presented at the SITE 98: Society for Information Technology & Teacher Education International Conference, Washington, DC.

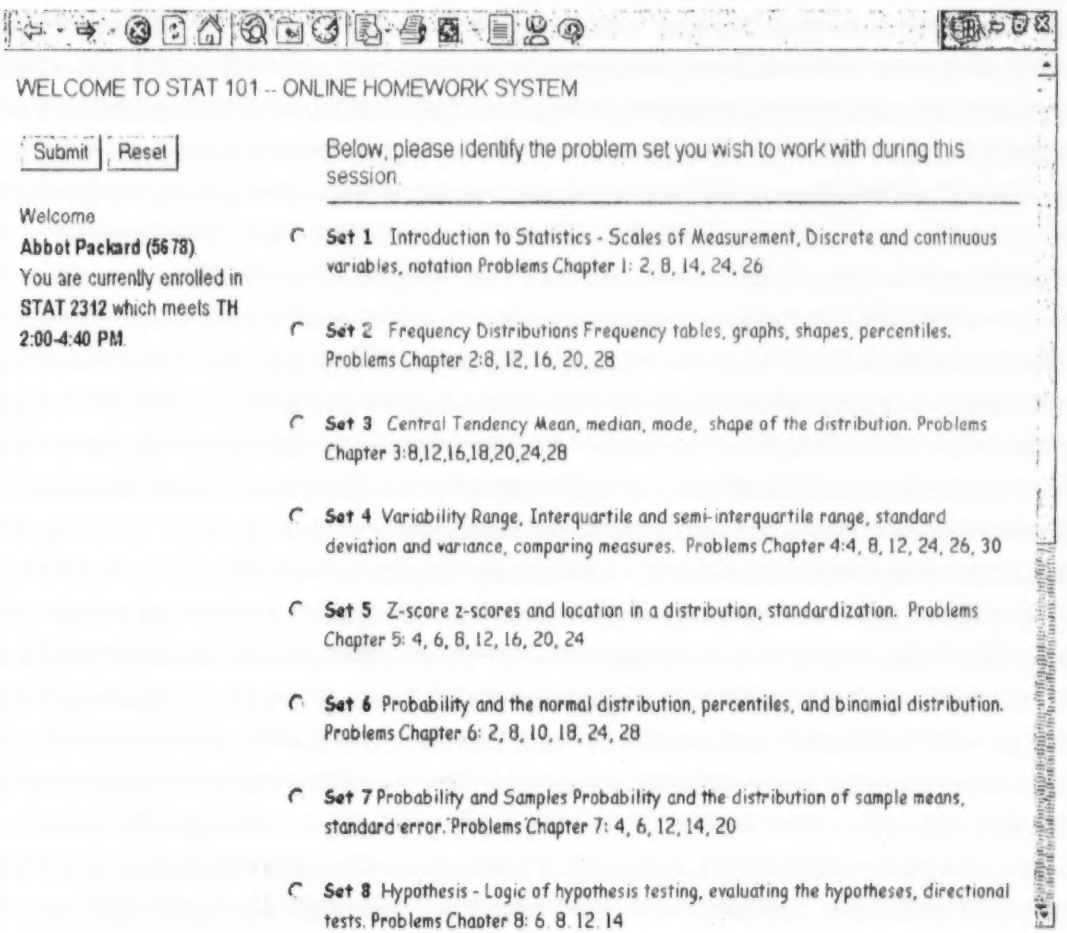
Neill, J. (1998, August 5-7, 1998). *Practice Makes Learning.* Paper presented at the Annual Conference on Distance Teaching & Learning, Madison, WI.

Winne, P. H. (1995). Inherent details in self-regulated learning. *Educational Psychologist, 30*(4), 173 - 187.

APPENDIX A

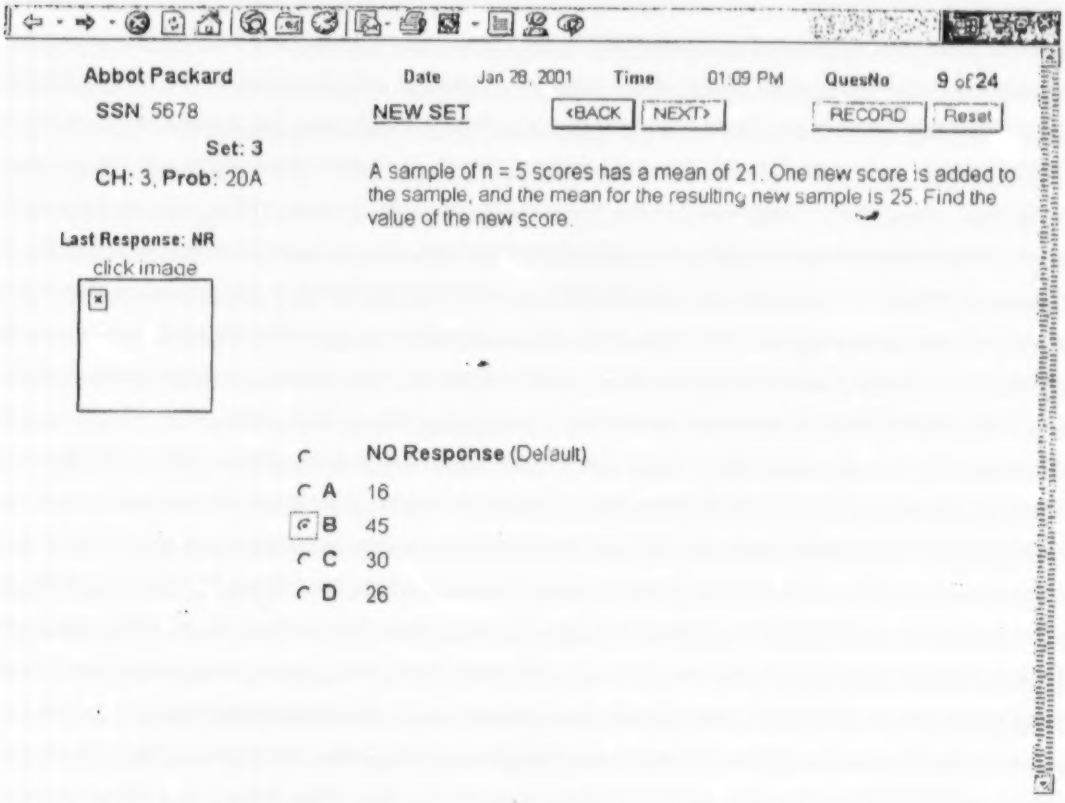
Opening screen.

The student is welcomed by name, with course section and day /time. The student can choose any of the homework assignment to work on by checking the radio button and clicking submit.


WELCOME TO STAT 101 -- ONLINE HOMEWORK SYSTEM
Submit
Reset
Welcome
Abbot Packard (5678).
You are currently enrolled in
STAT 2312 which meets TH
2:00-4:40 PM.
Below, please identify the problem set you wish to work with during this session.
Set 1 Introduction to Statistics - Scales of Measurement, Discrete and continuous variables, notation Problems Chapter 1: 2, 8, 14, 24, 26
Set 2 Frequency Distributions Frequency tables, graphs, shapes, percentiles. Problems Chapter 2:8, 12, 16, 20, 28
Set 3 Central Tendency Mean, median, mode, shape of the distribution. Problems Chapter 3:8,12,16,18,20,24,28
Set 4 Variability Range, Interquartile and semi-interquartile range, standard deviation and variance, comparing measures. Problems Chapter 4:4, 8, 12, 24, 26, 30
Set 5 Z-score z-scores and location in a distribution, standardization. Problems Chapter 5: 4, 6, 8, 12, 16, 20, 24
Set 6 Probability and the normal distribution, percentiles, and binomial distribution. Problems Chapter 6: 2, 8, 10, 18, 24, 28
Set 7 Probability and Samples Probability and the distribution of sample means, standard error. Problems Chapter 7: 4, 6, 12, 14, 20
Set 8 Hypothesis - Logic of hypothesis testing, evaluating the hypotheses, directional tests. Problems Chapter 8: 6. 8. 12. 14

APPENDIX B

Once selection of the set of homework is made, the student has the option of working on line or separately and only check answers on-line.



Abbot Packard Date Jan 28, 2001 Time 01:09 PM QuesNo 9 of 24

SSN: 5678 NEW SET <BACK NEXT> RECORD Reset

Set: 3

CH: 3, Prob: 20A

A sample of n = 5 scores has a mean of 21. One new score is added to the sample, and the mean for the resulting new sample is 25. Find the value of the new score.

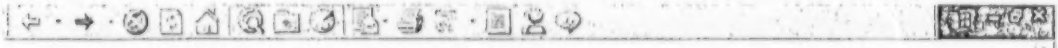
Last Response: NR

click image

- NO Response (Default)
- A 16
- B 45
- C 30
- D 26

APPENDIX C

Once the answers for the problems are submitted by presenting the record button, the response screen appears. The students name appears with the score for the answers submitted. Here the correctness is at 79% and the student can click on the hint beside the incorrect answer such as QNO 4 and receive a hint to completing the problem



DO ANOTHER and/or REPEAT SET LOG OUT-QUIT

Abbot Packard
Your final score is 19 out of 24 = 79%

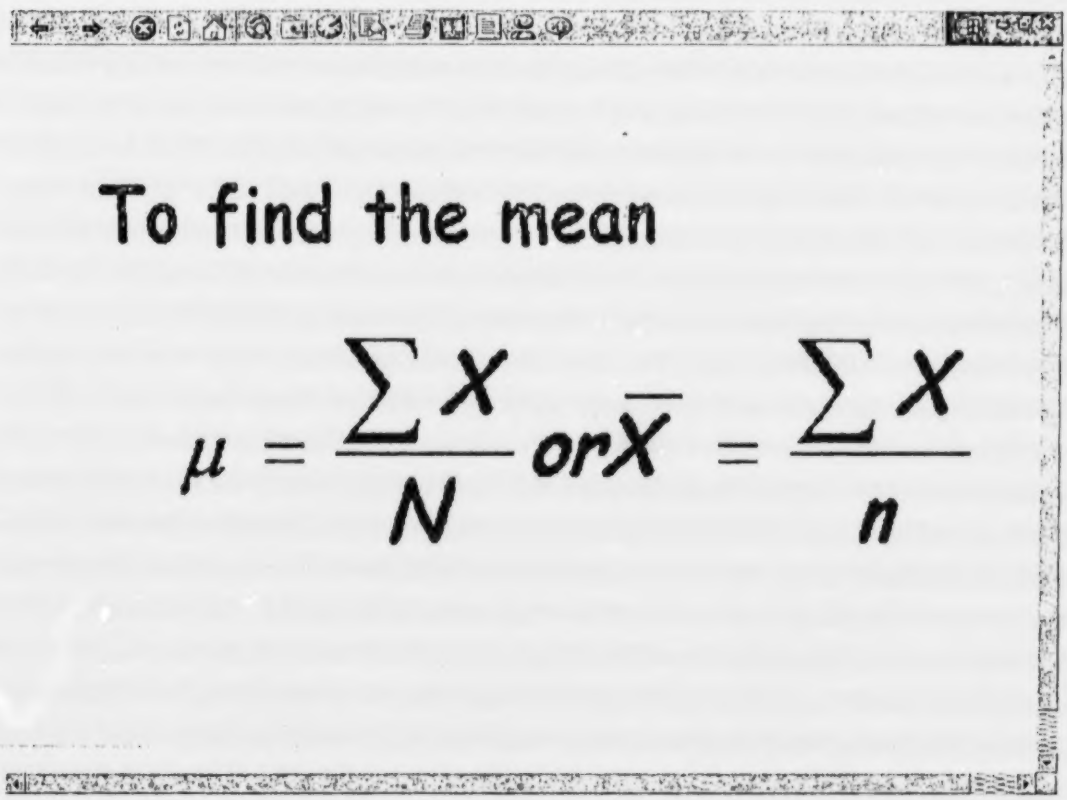
Below you'll find some helpful hints if you click on available question part numbers

SET NO: 3

QNO	Your Answer [ ] was	PART NO
1	[D] Correct	8[A]
2	[B] Correct	8[B]
3	[C] Correct	8[C]
4	[C] Wrong	12[A]
5	[A] Wrong	12[B]
6	[D] Correct	12[C]
7	[D] Correct	16[A]
8	[C] Correct	18[D]
9	[B] Correct	20[A]
10	[C] Correct	24[A]
11	[A] Correct	28[A]
12	[B] Correct	28[B]
13	[B] Correct	32[A]

APPENDIX D

The hint screen appears and the student can see the methodology to complete the question correctly. If the student used the correct formula, then checking the mathematics is proper solution. If the formula was not chosen originally the student now can go back and correct the mistake.



APPENDIX E

Homework delivery notes

1) Assignments
   - A. Chapter and problems
     1. Question and answers
     2. Tables and/or graphics display

II. Check answers
   - A. Correct or wrong
     1. With percentage
     2. Without giving the correct response
   - B. Hints how to do
     1. Instead of answers, giving hints to solve the problem correctly.
        a) With text, graphic image or combinations
   - C. Instant correction with percentage score for
     1. Faculty
        a) Allows the faculty to see changes needed in lecturing
           (1) Create facility to store every entry by student
               (a) First entry with error or error free will demonstrate the lecture effectiveness
        b) To make changes as often as necessary with little difficulty
           (1) To create new homework sets
           (2) To correct any typographical mistakes
           (3) To create more beneficial hints
        c) Grading to be done automatically saving to a text delimitated file for easy enter in grade book.
     2. Students
        a) Allows the student to see errors
        b) Allow students to re-submit problems after correcting any mistakes
        c) Giving the students an immediate grade for assignments

APPENDIX F

Sample data from Access

ID 432 Set 12 Chapter 16 ProblemNo 12

ProblemPart	d
QuestionStem	It is well known that similarity in attitudes, beliefs, and interests plays an important role in interpersonal attractions. Thus, correlations for attitudes between married couples should be strong. Suppose a researcher developed a questionnaire that measures how liberal or conservative one's attitudes are. Low scores indicate that the person has liberal attitudes, while high scores indicate conservatism. The following hypothetical data are scores for married couples. Determine the value of r
AnsA	0.85
AnsB	0.909
AnsC	-0.85
AnsD	-0.909
Correct	b
ImageQues	imag1612d
ImageHint	hint1612d
ImageSolution	sol1612d
DataSet	yes
DSRows	9
DSCols	3
Row0	Couple, Wife, Husband
Row1	A,11,14
Row2	B,6,7
Row3	C,18,15
Row4	D,4,7
Row5	E,1,3
Row6	F,10,9
Row7	G,5,9
Row8	H3,3

APPENDIX G

Email from one very math anxious student who had been sick the day Chapter 5 was presented in class sent this statement.

Abbot,

Thank you, I am on the mend though my head feels like it's in a fish bowl. Geez...

Last night I went through chapter 5 in the text and did the homework that was on the web site. I did it, on my own and I did it right! I was so pleased. Being able to check my answers on site has made all the difference for me. I hope we can continue to use the web site. I did have some troubles near the end and will ask about them tomorrow in class if they are not brought up.

See you then,

Tammy

AERA

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